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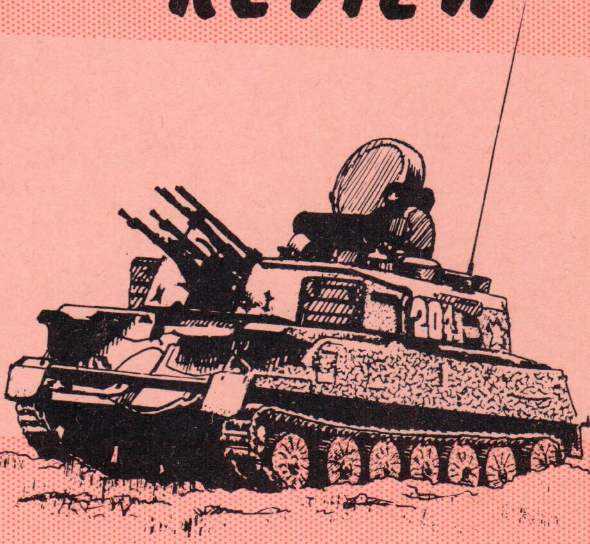
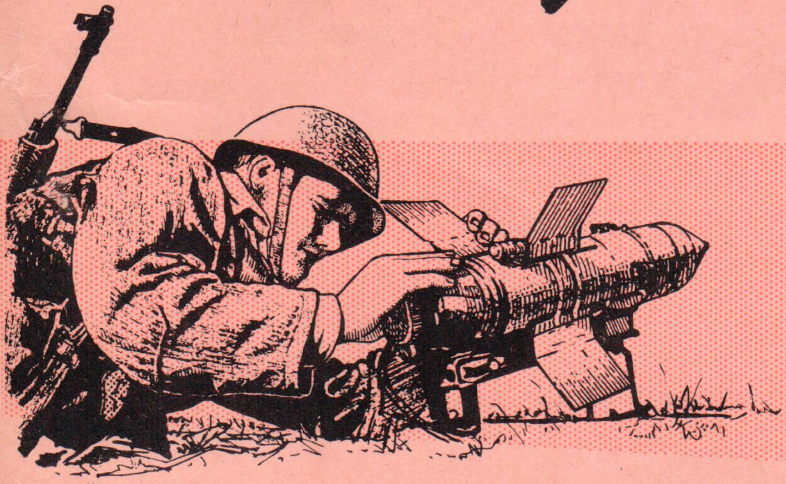
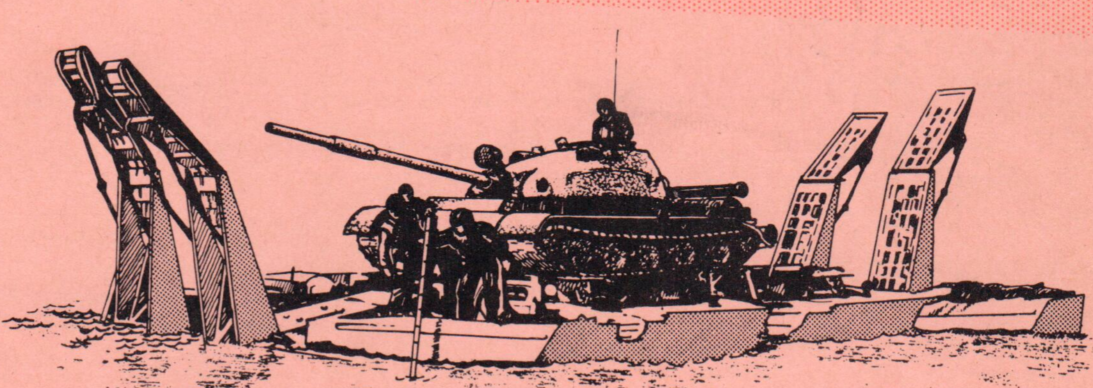
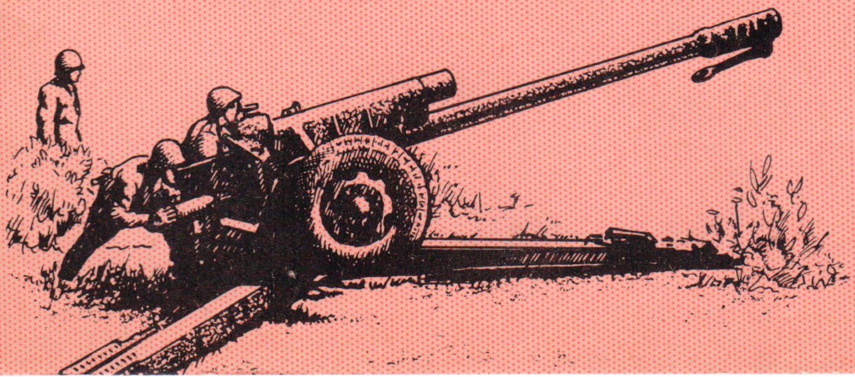
ARMY TECHNICAL INTELLIGENCE REVIEW

SUPPLEMENT - January 1974









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ARMY TECHNICAL INTELLIGENCE REVIEW No 104 (SECRET)

SUPPLEMENT – JANUARY 1974

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Total No of Pages 30

ERRATUM

1. Amendment to:

ATIR DIGEST MAY 1973 'SOVIET GROUND FORCES MISSILE SYSTEMS'

Pages 90, 96 and 98 – Under "System Performances"

(a) delete "Range" insert "Altitude"
(b) delete "Altitude " insert "Range"

2. Amendment to:

ATIR 102 (Sup) January 1973

Page 13 last line – delete existing detail insert "Fuse Base Detonating (BD)"

FOREWORD

I am glad to say that we have been able to keep our promise about the article on Chinese AFVs. The second part – dealing with the Light Amphibious Tank Type 60/63 – appears in this issue.

The remainder of the issue is devoted largely to a rather unconventional article which I hope will prove useful dealing as it does with the recognition features associated with battlefield radars.

W A H FAIRBAIRN
Colonel
Tech Int (A)

1. Chinese AFVs-Part 2
Light Amphibious Tank Type 60/63

(CONFIDENTIAL)

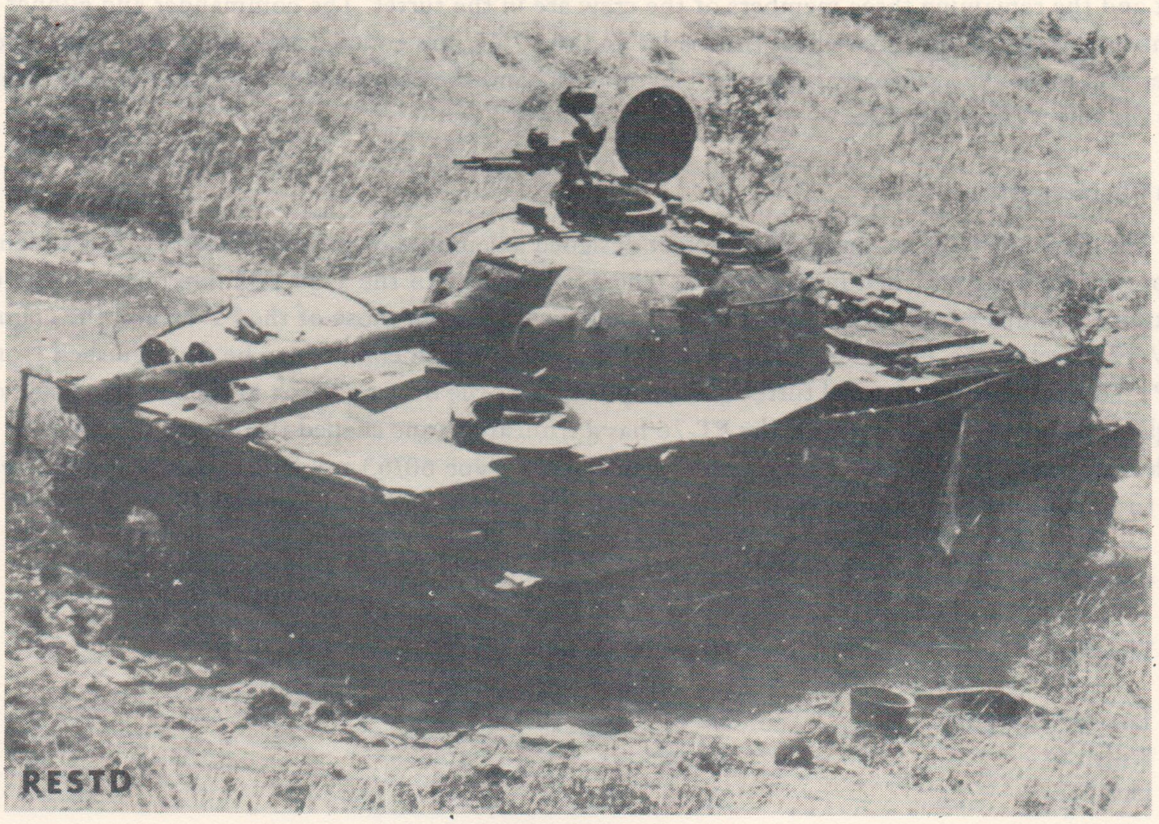


Fig 1. Light Amphibious Tank Type 60/63

First Reports

From 1970 onwards there were rumours that the Chinese had produced an amphibious tank similar to the Soviet PT-76. It was not until the North Vietnamese 1972 Spring Offensive however, that the existence of the tank was confirmed and the capture of several enabled some of the characteristics to be determined.

Nomenclature

Conflicting reports on the tank's nomenclature led to it being designated the Type 60/63. The official Chinese nomenclature is still unknown. It is argued that because the 100 mm gun of the Type 59 medium tank is designated Type 59–100 mm that the Type 60/63 tank's correct Chinese designation is Type 63 or PT-63 as its gun is marked 63–85. However, the same 85 mm gun is mounted in the Chinese light tank which is thought to be called the Type 62, so that the marking on the gun cannot be regarded as conclusive. The fact that the 100 mm gun bears the same designation as the tank on which it is mounted may be purely fortuitous. For this reason the term Type 60/63 has been adopted and will be used until the Chinese nomenclature is known.

General Layout

The Type 60/63 has the conventional arrangement of a rear engined hull with a turret mounted with its transverse centre line slightly forward of that of the hull. The hull is thinly armoured and pannier shaped to increase the volume sufficiently to give the tank adequate buoyancy without the aid of flotation screens. In the rear of the hull in addition to the engine are the transmission and the water jets for land and water propulsion respectively. The driver is on the left hand side of the hull front and the remaining three members of the crew are in the turret. The commander and gunner are on the left of the 85 mm gun whilst the loader and the 7.62 mm co-axial MG are on the right. The loader also mans the externally mounted 12.7 mm MG and the commander operates the radio which is on the turret sill to his left.

Main Characteristics

The Type 60/63 is an amalgam of Soviet designed assemblies of proven reliability, but which had not previously been matched in one vehicle. The gun is a copy of the T-34's 85 mm improved by the addition of a fume extractor. The running gear and water-jets are those of the PT-76 and the engine is the V-12 diesel of the T-54. The main physical differences which enable it to be distinguished from the PT-76 are the hemispherical turret and the position of the driver's hatch in the left-hand side of the glacis plate (Fig 1). In contrast the PT-76 has a truncated cone shaped turret and the driver's hatch is placed centrally. The main characteristics of the Type 60/63 are set out below and may be used to update the information given on page 104 of the AFV Digest of January 1972.

Crew	4
Weight	18 tonne (estimated)
Length (less gun)	7.2 m
Width	3.2 m
Height:	
a. Overall	2.8 m
b. To top of turret	2.1 m
Armament:	
a. Main	85 mm rifled gun with fume extractor.
b. Secondary	Co-axial MG Type 57, 7.62 mm (Copy of Soviet SGMT) External MG Type 54, 12.7 mm (Copy of Soviet DShK).
Ammunition	56 rounds carried. Natures are APHE, HE and probably HVAP.
Engine	V-12 diesel (Copy of Soviet W-54) developing 520 BHP.
Speeds:	
Land	Road 50 kph Cross Country 25 kph
Water	12 kph

The hull and the running gear of the Type 60/63 differ very little in principle from that of PT-76. The following paragraphs will highlight the areas where there is a major difference between the two tanks.

TURRET

Turret Shell

The turret appears to be similar to that of the Chinese Type 62 light tank. They can be recognised from each other easily, however, as the Type 62 has its ventilator dome on the front right of the roof plate in front of the loader's hatch whereas on the Type 60/63 it is central at the rear. The hemispherical shape of these two turrets makes them appear to be cast but they are not. The mantlet housing (Fig 2(20)) has a curved segment welded on each side. The left hand segment has welded to it an armoured cover to protect the gunner's sighting telescope which protrudes through an aperture in the segment. The right segment has an aperture in it for the co-axial MG (Fig 2(14)) and both have lifting hooks (Fig 2(15)) welded to them. The turret shell is completed by five more curved segments of 17 mm thickness. These segments differ in size. Two form the left side, one the rear and two the right side of the turret. Hand rails are fitted on the sides and rear of the turret and there are two more lifting hooks, one at the left rear below the commander's cupola and one in a corresponding position on the right rear. Other features are:

a. **Radio Antenna Base.** This is situated in a socket on the left front of the turret side.

b. **Stowage Straps Loops.** There are several loops for stowage straps on the rear of the turret but the straps were nearly all missing on the two tanks examined.

c. **External Infantry/Tank Telephone.** A small box on the turret rear contains the socket for a headset for the commander of any infantry party carried on the tank.

d. **12.7 mm MG Brackets.** There is a bracket on the rear of the turret for the 12.7 mm MG and the cradle of its mounting. These are stowed here for rail and ship movement of the tank.

Mantlet and Housing (Fig 2(20))

The 85 mm gun has a pot type mantlet which is externally bolted to the gun mounting. The mounting pivots on trunnions in a rectangular open-ended box which forms the housing for the mantlet and mounting. A canvas cover is fitted over the mantlet and external opening of the housing. This cover is secured to the mantlet by a ring of 8 bolts around its forward edge and to the housing by 6 bolts on the upper and lower horizontal edge and another 7 on each of the vertical sides. There is a large air gap of about 10–15 mm between the mantlet and the housing when the gun is fully elevated (Fig 3(1)). This gap gradually closes as the gun is depressed to the horizontal.

Turret Roof

The turret roof is a horizontal 9 mm plate which is welded to the top of the mantlet housing and the turret side segments. The following items are fitted to it:

a. **Commander's Cupola.** (Fig 2(19)).

b. **Ventilator Dome.** This is probably the air outlet of an extractor fan.

c. **Loader's Hatch.** (Fig 2(17)). With 12.7 mm MG mounting.

d. **Loader's Periscope.** (Fig 2(18)). A Chinese copy of the Soviet MK-4 periscope in a tilting and rotating housing.

e. **Gunner's Periscope.** As for d. above.

Vulnerability

Although the turret has slightly thicker armour than the hull it is still prone to defeat by the same sort of weapons because of its domed shape. A projectile fired from a ground sited weapon would have a good chance of striking the turret at angles of 30° to the normal and below. In view of this the sides and rear of the turret are likely to be penetrated by 0.50-in AP M2 fired at ranges below 400 m. The turret front plates probably provide a measure of immunity against 0.50-in AP but will be vulnerable to 20 mm and higher calibre kinetic energy projectiles. The main ballistic weakness, however, lies in the mantlet. In addition to the gap between the mantlet and the housing, there is no form of splash protection, ie the ingress of small arms bullet fragments. Not only will the turret crew be prone to injury from splash and/or shell fragments but these may well lodge between the mantlet and its housing to jam it and prevent the gun being moved in elevation.

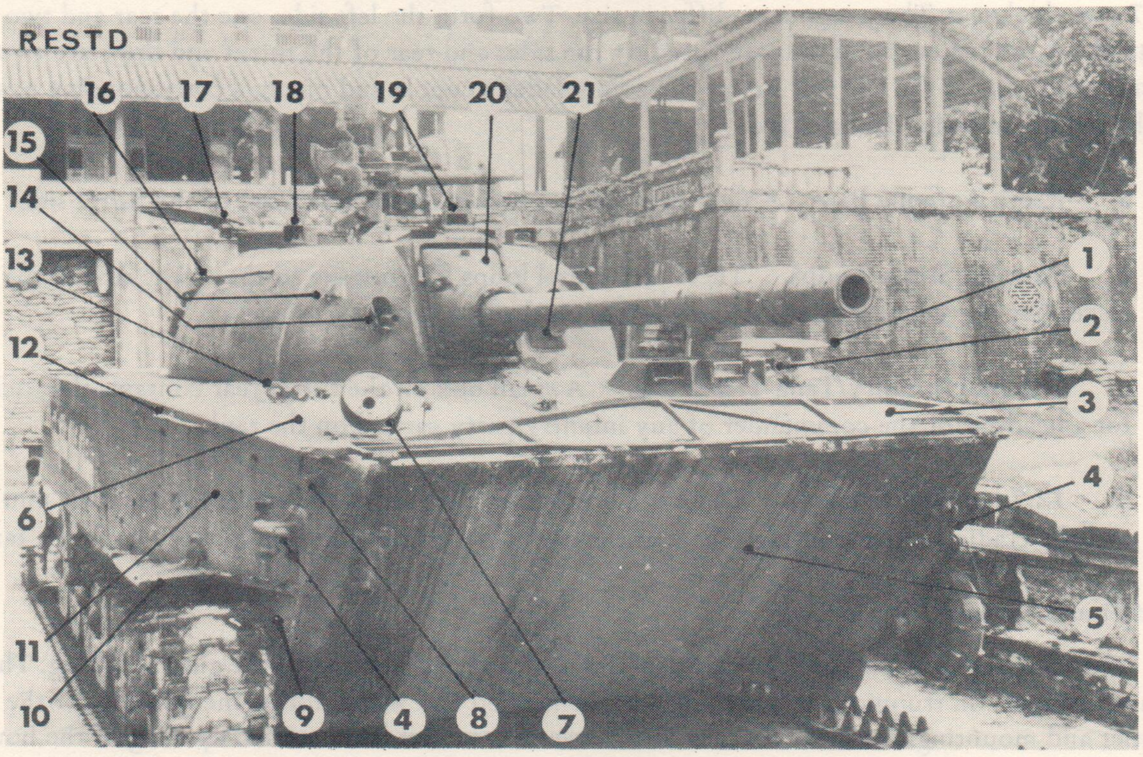


Fig 2. Type 60/63 Tank – Front View

1. Driver's Hatch
2. Driver's Periscopes
3. Wading Board
4. Bollards
5. Nose Plate
6. Glacis Plate
7. Headlight
8. Wading Board Linkage
9. Lower Side Plate
10. Track Guard
11. Front Upper Side Plate
12. Handle
13. Stowage Fitments (probably for a tow rope)
14. Co-axial MG
15. Turret Lifting Hook
16. Handrail
17. Loader's Hatch
18. Loader's Periscope
19. Commander's Cupola
20. Mantlet and Mantlet Housing
21. Gunner's Sight Cover

ARMAMENT

Main Armament

The Type 63-85 mm gun and its mounting are copied from the Soviet Model 1944 85 mm gun and the mounting used for its installation in the T-34/85 tank. The main difference is that the Chinese gun has a fume extractor fitted just in the rear of the muzzle. Both guns have open jawed breech rings with vertical falling sliding breech blocks. On the Type 63-85 mm gun a large counterweight (Fig 3(4)) is screwed to the top of the breech ring to reduce the muzzle preponderance. The breech mechanism lever is on the right hand side of the breech ring and the semi-automatic cam is below it. The cam is actuated to open the breech on runout by a bracket attached to an extension from the mounting. The forward face of the mounting is bolted to the mantlet and welded to its rear face is the cylindrical gun cradle in which the chamber end of the barrel is supported. The hydraulic buffer and hydro-pneumatic recuperator are fitted to the right and left underside of the cradle respectively and their piston rods are attached to the breech ring gun lugs by hexagonal nuts in the normal manner. Extending rearwards from the mounting on either side of the cradle are extension arms. The left arm (Fig 3(8)) has the elevation arc and the recoil guard bolted to it. Mounted on the recoil guard are the gun firing solenoid mechanical firing gear, recoil indicator and the clinometer. The right hand extension arm has the MG mounting fitted on its right side and the gun firing circuit safety switch (Fig 3(2)) is located on top of it. The semi-automatic bracket, previously mentioned, is also attached to the right hand extension arm.

Main Armament Ammunition

Natures. The Chinese Type 63-85 mm gun and the Soviet Model 1944 85 mm gun have common ammunition. Only two natures have been confirmed for the Chinese gun. These are the Soviet manufactured UBR-365K APHE round and the US-367 reduced charge HE round. From the sets of graticule marks in the gunner's sight it is fairly certain that the UBR-365 APHE round is also carried on the tank. The UBR-365 PK HVAP may be yet another nature which is carried and fired using a false range scale.

Stowage. 56 rounds are thought to be stowed in the tank as follows:

a. **Turret (Fig 4).** 4 rounds are stowed in clips in the turret bustle (1) and 2 more rounds in similar clips are on the inner right hand wall (4) by the loader.

b. **Fighting Compartment Floor.** 26 rounds are stowed in the 13 2-round bins under the fighting compartment floor. There are 7 bins in the front row and 6 in the rear, the extra space in the rear row being used for the gunner's tool bag.

c. **Left Pannier.** 6 rounds are stowed in clips in the pannier to the left rear of the fighting compartment and another 3 rounds in clips are stowed on the lower hull wall below the pannier.

d. **Right Pannier.** 12.rounds are stowed in clips in the right pannier in 2 sets of 6 with another 3 in clips on the lower hull wall.

Secondary Armament

a. **Co-axial 7.62 mm MG.** The co-axial MG is the Type 57 7.62 mm MG which is a Chinese copy of the Soviet SGMT. Its mounting like most Soviet co-axial MG mountings has an adjustable cradle which allows the MG to be zeroed to the gun sight once this has been zeroed to the main armament. The MG is supplied with ammunition from a box mounted in a frame fitted to the turret sill on the right of the mounting.

b. **12.7 mm External MG.** A Chinese Type 54 12.7 mm MG, which is a copy of the Soviet DShK12.7 mm MG, is fitted on the standard pattern external mount used on tanks for this gun. It has all-round traverse and its elevation range is probably that of the similar mounting on the T-54, ie –4½° to 82°.

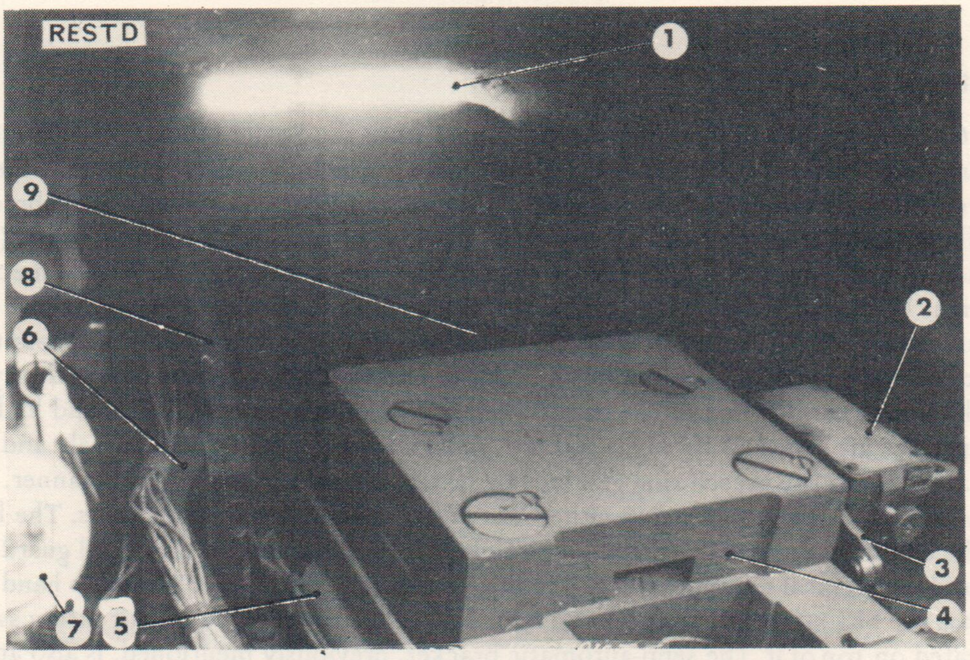


Fig 3. 85 mm Gun – Breech and Mounting

1. Gap – between mantlet and housing, gun elevated.
2. 85 mm Gun Firing Circuit Safety Switch.
3. Tripping Roller for 2 above.
4. Breech Counter-weight.
5. Left-hand Recoil Guard.
6. Elevation Gearbox Arm.
7. Gunner's Sight.
8. Left Extension Arm of 85 mm Gun Mounting.
9. 85 mm Gun Cradle.

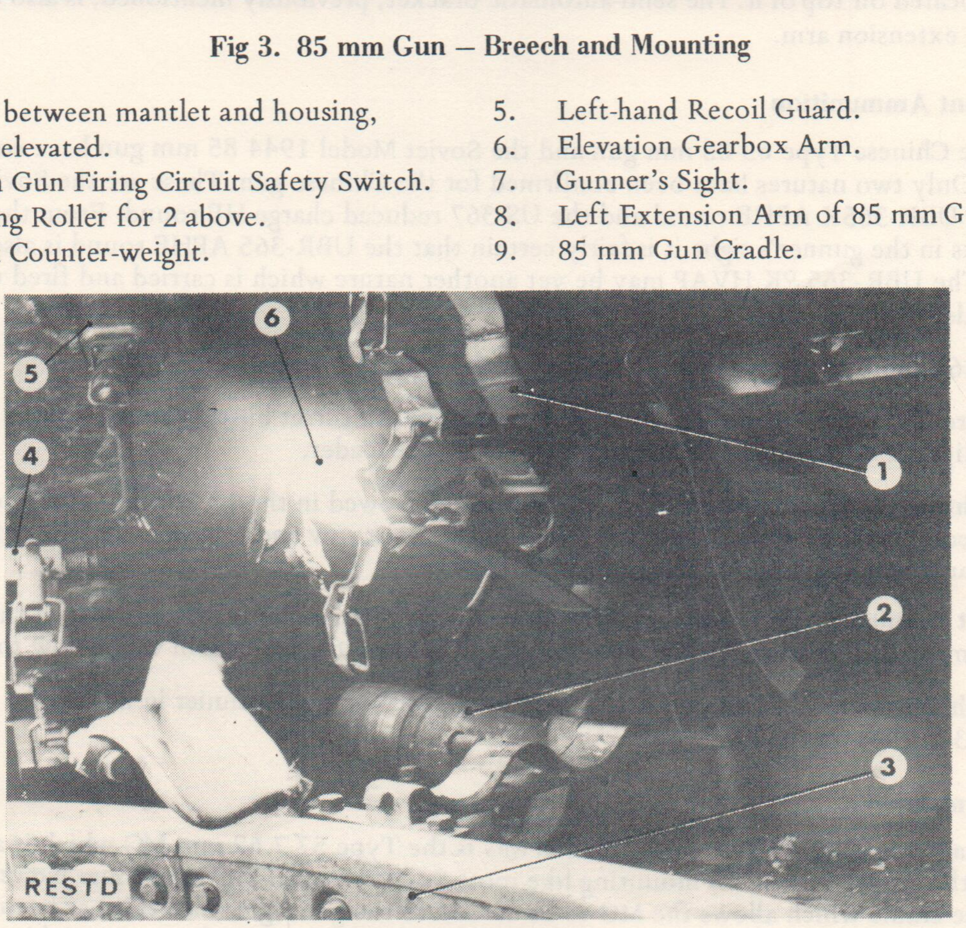


Fig 4. Turret Bustle

1. Clips for four 85 mm Rounds.
2. 85 mm Projectile – loose in turret.
3. Turret Ring Cover.
4. Clips for two 85 mm Rounds.
5. Loader's Headset Socket.
6. Hole in Turret Rear Armour.

ENGINE

The engine appears to be the same basic V 12-cylinder diesel as used in the Type 59 and T-54 tanks, but it is mounted longitudinally. The power output of the engine is probably 520 hp as is that of the medium tanks' engines. One major difference between the Type 60/63 engine installation is that cooling appears to be carried out not by a fan as on the medium tanks but by the same system as is used for the PT-76 engine. This uses cooling air through the radiators. The use of this system would appear to be confirmed on the Type 60/63 by the layout of the air intake and engine exhaust louvres.

One problem which may arise with this installation is inadequate cooling. The PT-76 is reported as having such problems particularly when swimming. The possibility of overheating would appear to be considerably worse on the Type 60/63 as the installation space is not much greater than that of PT-76 yet the engine power output is doubled.

If our estimate of the weight is correct at 18 tonne then the power to weight ratio is 29 bhp/tonne. This is the highest ratio of any known AFV currently in service in the world.

GENERAL ASSESSMENT

General Design

The Type 60/63 tank contains no revolutionary or original components and is an amalgam of Soviet designed assemblies of proven reliability. Without extensive running trials it is impossible to say whether or not the Chinese arrangement of these components is reliable as items such as the engine, gearbox and water jets have not been previously matched in the same vehicle. Considering the tank's bulk the accessibility of automotive components is not as good as it might be, especially the engine and its associated fuel, cooling and lubrication systems. As with most Soviet and Chinese AFVs the stowage arrangements are sparse both for vehicle tools and personal kit.

Armament

The fitting of an 85 mm gun might at first seem to be a significant improvement over the 76 mm of the PT-76. However, even in Communist open press articles it is admitted that the 85 mm gun is inadequate for dealing with the frontal aspect of modern medium tanks. There is therefore little practical improvement in offensive capability against medium tanks but the 85 mm gun would be quite adequate against the M41 and M24 series of light tanks. It is considered that the Type 60/63 could not be up-gunned.

Protection

Protection is sacrificed to give the tank an amphibious capability. In many places the tank is vulnerable to the US 0.50-in MG firing AP M2 ammunition and to shell fragments from artillery shells exploding within 10 m of the vehicle. Practically all aspects of the tank are vulnerable to 20 mm and higher calibre kinetic energy projectiles and all hollow charge weapons. Not only is the armour very slight but there is no secondary protection of ammunition and fuel against fragments. This combined with the rubber floor matting in the fighting compartment makes the tank very prone to internal fires after penetration, and yet there is no built-in fire-fighting equipment as on most Soviet tanks and those of most other countries. The extreme vulnerability of the Type 60/63 tank can be seen in the many post-battle photographs of it which show catastrophic defeat of the armour followed by a fierce fire. Apart from its poor ballistic protection it would be impossible to give the crew any measure of NBC protection without considerably re-designing the mantlet and its housing.

Mobility

The acceleration of the Type 60/63 with its power to weight ratio of 29 hp/tonne should be good but its road speed is likely to be limited by track life and its primitive clutch and brake steering mechanism to about 50 km/hr. Higher speeds could be obtained but minor steering corrections become difficult with non-regenerative systems at such speeds. Similarly the use of full power in cross country movement on hard going is likely to be restricted by the simple torsion bar suspension and speeds above 25 km/hr are thought to be improbable. The low ground clearance of 300 mm may affect the tank's performance in soft going but as long as traction is obtained the engine power should largely compensate for this shortcoming. In water the tank should be slightly faster and at least as manoeuvrable as the PT-76 but the general characteristics of water jets will limit the maximum speed to about 10–12 km/hr.

CONCLUSION

The exact philosophy for the employment of this tank and consequently its design is hard to determine. Despite its amphibious capability the resultant large size of the hull makes it a difficult vehicle to conceal and largely nullifies its value in the reconnaissance role. Its thin armour combined with its bulk make it a relatively easy target to hit and kill with all but small arms so making it unsuitable for use as a medium tank either independently or in the support of infantry. Little benefit for protection or mobility would appear to come from its high power to weight ratio as its inefficient steering system and simple torsion bar suspension almost certainly prevents this being fully exploited to give a high road speed or fast cross country movement. In essence the tank is an improved PT-76 but whilst its amphibious characteristics make it as vulnerable the improvements do not give it a very much greater battlefield effectiveness.

2.Soviet Tropospheric Scatter Radio System TWIN PLATE (SECRET)

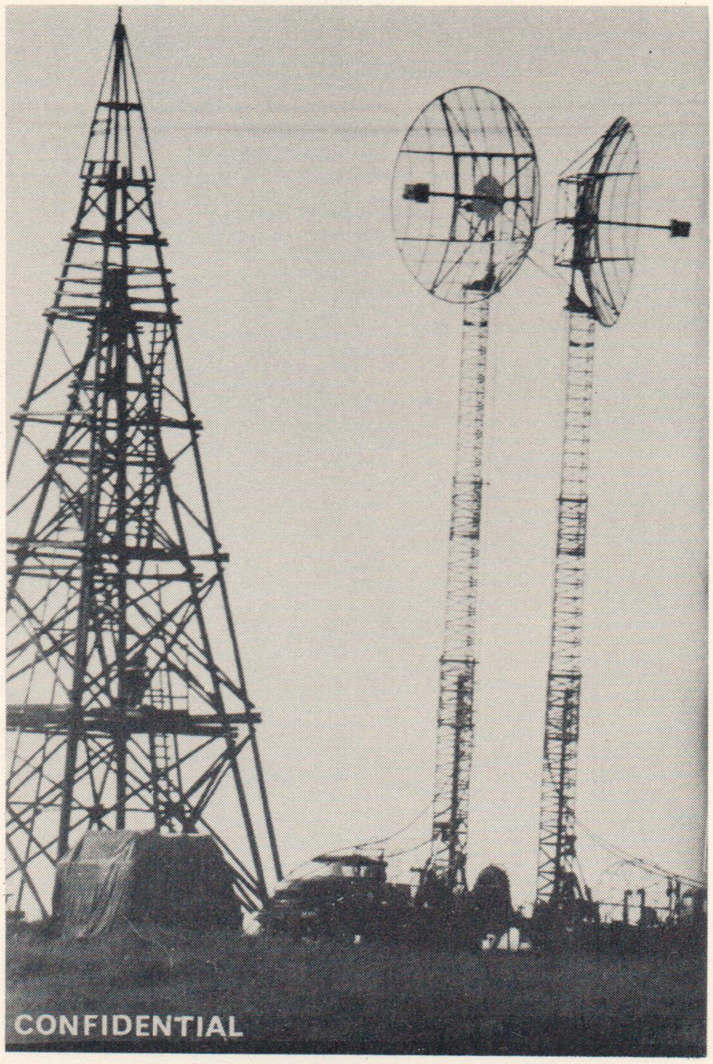


Fig 1. "TWIN PLATE"

Fig 1 shows a new tropospheric scatter system which is known as "TWIN PLATE". This equipment has been seen in East Germany and Czechoslovakia. The site generally has two or more parabolic antennas mounted on ZIL-131 lattice mast carriers, similar to those seen with the R-404 radio relay system. The antenna diameter is about 6.25 meters and it is fed by a small square horn mounted on a single strut about 4.3 meters in front of the dish. Near each antenna vehicle is a URAL-375 box bodied vehicle and a two axle trailer. The function of these vehicles is not clear, but they are believed to house the electronic equipment and assessories. Generator trailers are also located on each site. On the road, this system can be identified by the ZIL-131 mast vehicle towing a two axle trailer of distinctive shape. The mast vehicle and trailer are usually covered with a tarpaulin.

3. Identification of Soviet Battlefield Radars (SECRET)

INTRODUCTION

There are many illustrated reference books (perhaps too many) to assist both analysts and collectors in their work of identifying enemy equipment. Unfortunately these books all aim to confirm an identification and assume therefore that the reader has recognised the equipment.

Many Soviet radars look very much alike, especially when in transit. In addition, a great deal of identification has to be done from poor photography or during a fleeting glimpse of a distant equipment.

This article aims to assist in the task of identification by setting out the small but recognisable differences between equipments which, at first glance seem identical. In cases where very little information can be gleaned from the object in question, other clues are provided in the way of associations with types of units and other military equipments.

SCOPE

This guide is mainly concerned with battlefield radars. However other categories have been included where similarities exist which may make identification difficult. Obsolescent equipments have been included for the same reason.

LAYOUT

The equipments have been grouped so that those which closely resemble each other are adjacent in Sections 1 and 2. In Section 3, the order follows the appearance of equipments in previous sections as closely as possible.

Section 1 (Antennas)

Being able to see the antenna makes identification much easier. This section is devoted to the multitude of parabolic antennas. It may be of course that confirmation will have to be sought in subsequent sections.

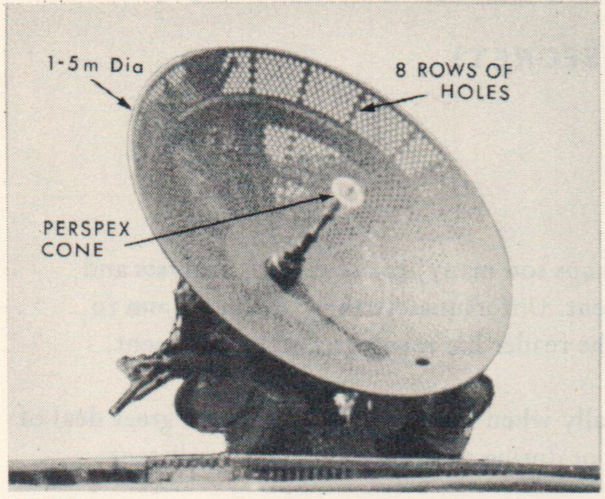
Section 2 (Carriage)

When the antenna is indistinct, hidden by obstructions or under canvas, the type of vehicle or trailer, on which the antenna is mounted, may often provide sufficient clues for identification.

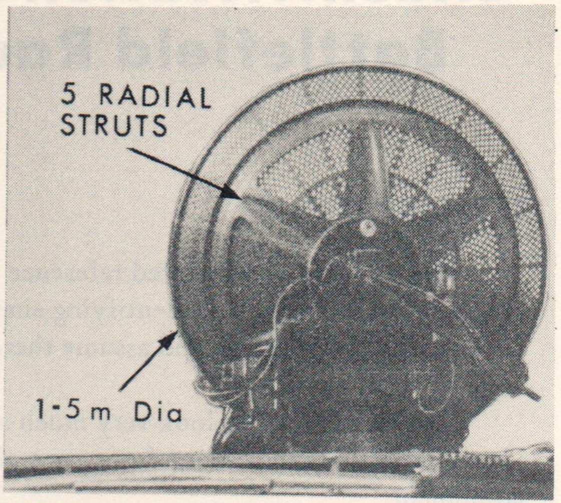
Section 3 (Associations)

This section indicates which units have the various radars and what other military equipments may be accompanying them.

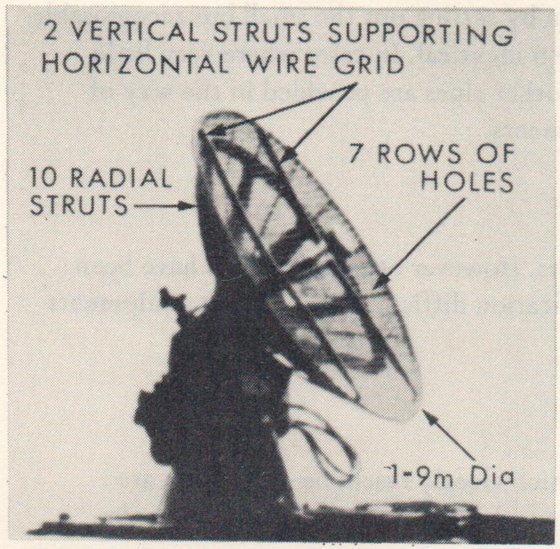
SECTION 1 (Parabolic Antennas)


1·5m Dia
8 ROWS OF HOLES
PERSPEX CONE

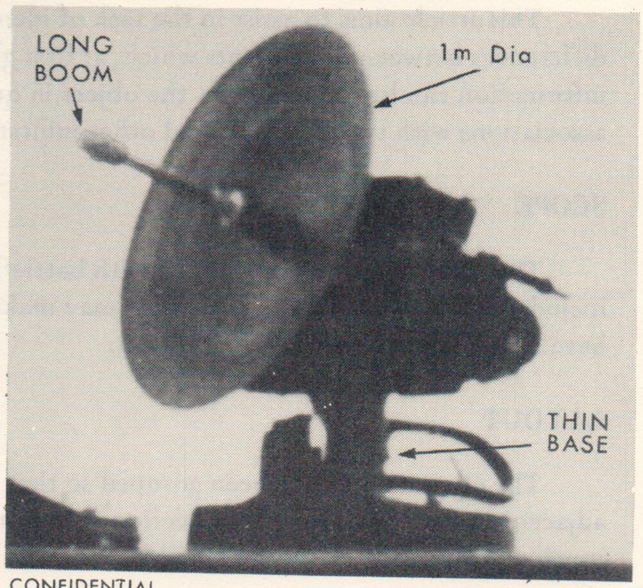
RESTD **FIRE CAN**


5 RADIAL STRUTS
1·5 m Dia

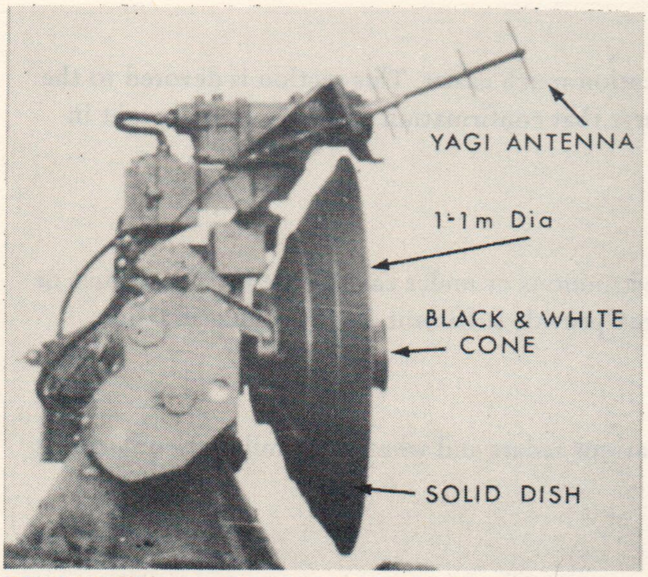
SECRET **FIRE CAN**


2 VERTICAL STRUTS SUPPORTING HORIZONTAL WIRE GRID
10 RADIAL STRUTS
7 ROWS OF HOLES
1·9m Dia

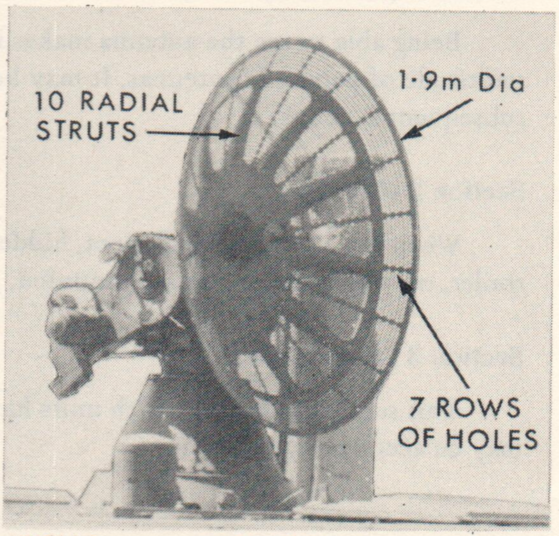
CONFIDENTIAL **END TRAY**


LONG BOOM
1m Dia
THIN BASE

CONFIDENTIAL **SMALL YAWN**

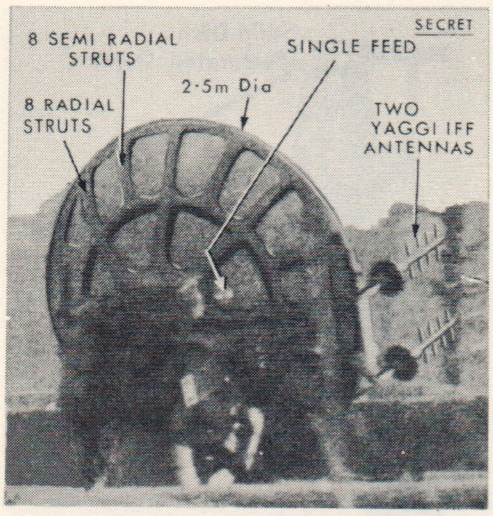

YAGI ANTENNA
1·1m Dia
BLACK & WHITE CONE
SOLID DISH

CONFIDENTIAL **FLAP WHEEL**

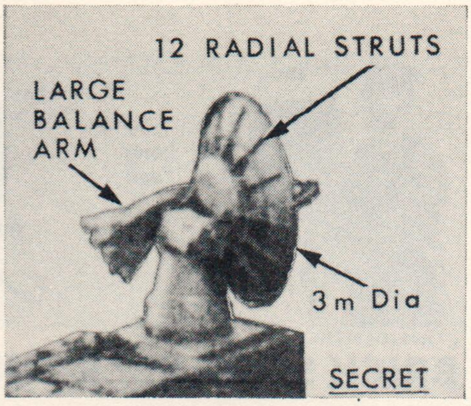

10 RADIAL STRUTS
1·9m Dia
7 ROWS OF HOLES

UNCLAS **WHIFF**

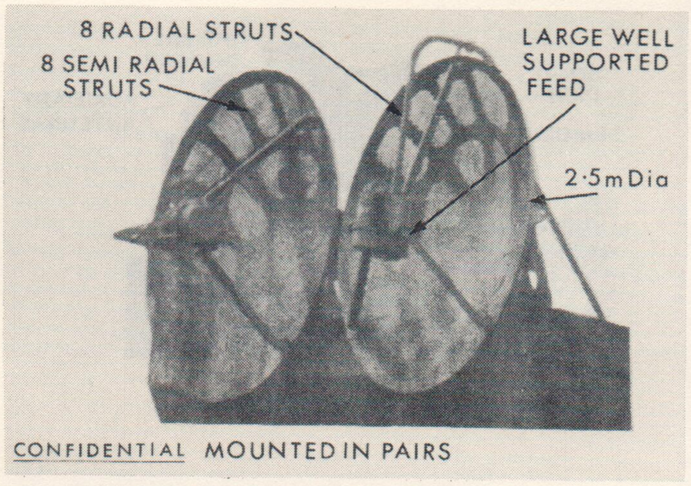
SECTION 1 (Parabolic Antennas) (Continued)


SECRET
8 SEMI RADIAL STRUTS
SINGLE FEED
2·5m Dia
8 RADIAL STRUTS
TWO YAGGI IFF ANTENNAS

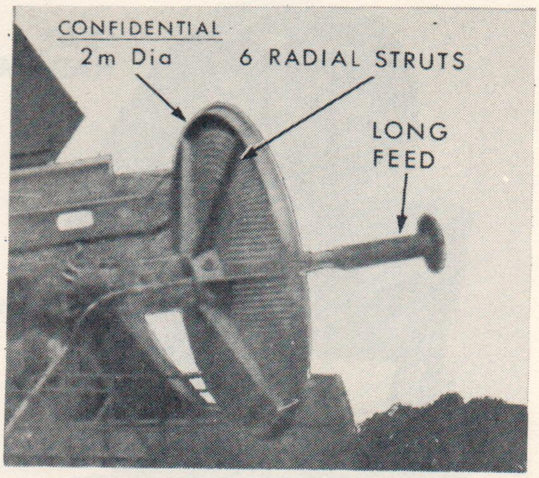
FIRE WHEEL


12 RADIAL STRUTS
LARGE BALANCE ARM
3m Dia
SECRET

MRL-1

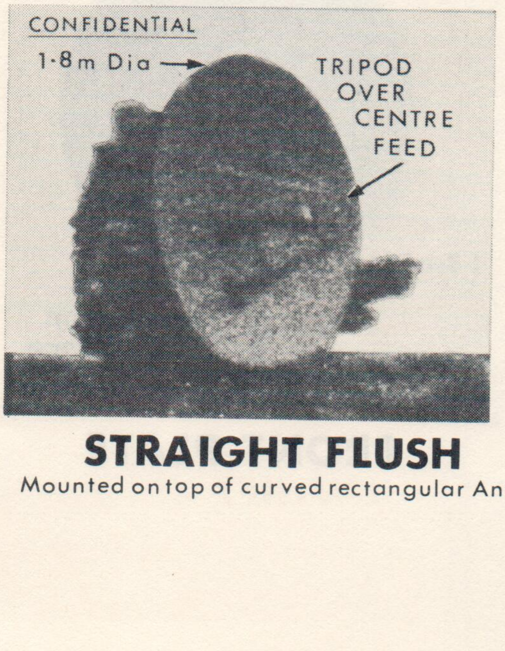

8 RADIAL STRUTS
8 SEMI RADIAL STRUTS
LARGE WELL SUPPORTED FEED
2·5m Dia
CONFIDENTIAL
MOUNTED IN PAIRS

FAN SONG E


CONFIDENTIAL
2m Dia
6 RADIAL STRUTS
LONG FEED

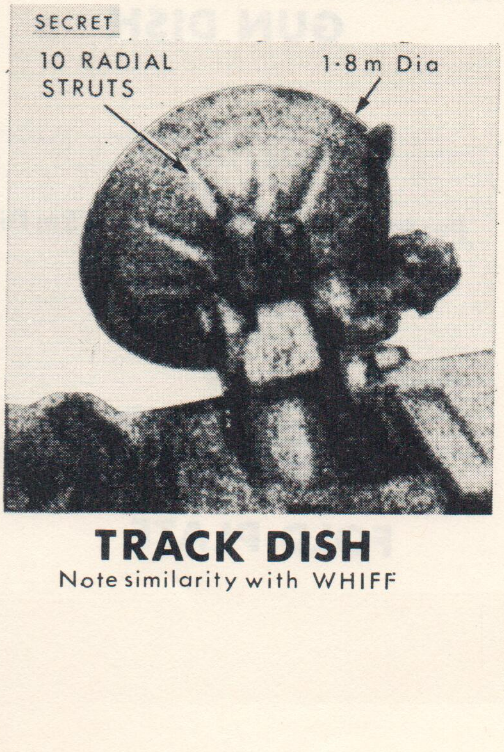
FAN SONG

Auxiliary Antenna


CONFIDENTIAL
1·8m Dia
TRIPOD OVER CENTRE FEED

STRAIGHT FLUSH

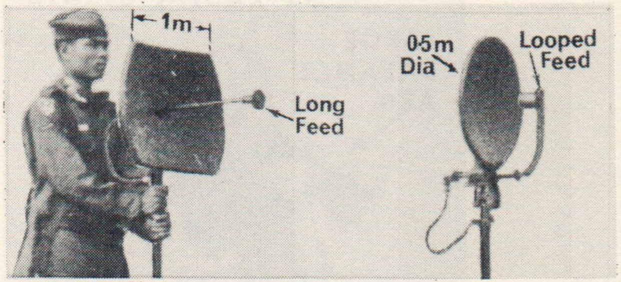
Mounted on top of curved rectangular Antenna


SECRET
10 RADIAL STRUTS
1·8m Dia

TRACK DISH

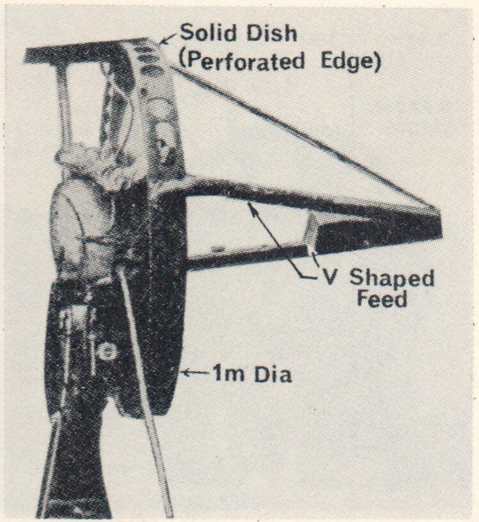
Note similarity with WHIFF

SECTION 1 (Parabolic Antennas) (Continued)


1m
0·5m Dia
Looped Feed
Long Feed

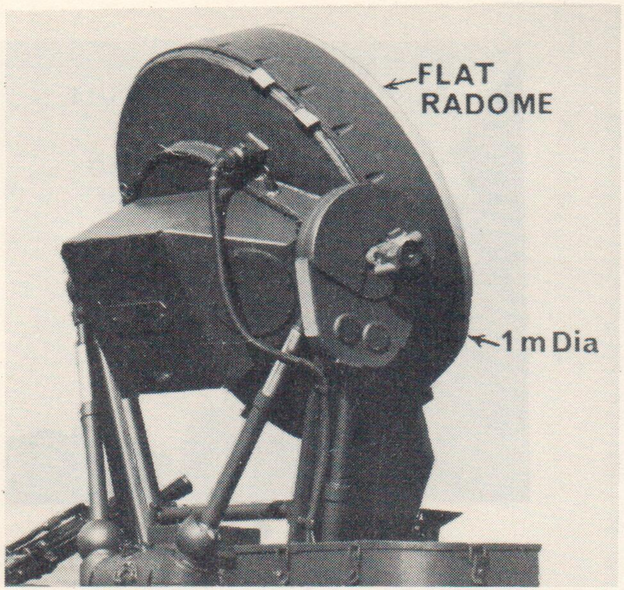
CONFIDENTIAL

BRICK SQUARE/ROUND


Solid Dish (Perforated Edge)
V Shaped Feed
1m Dia

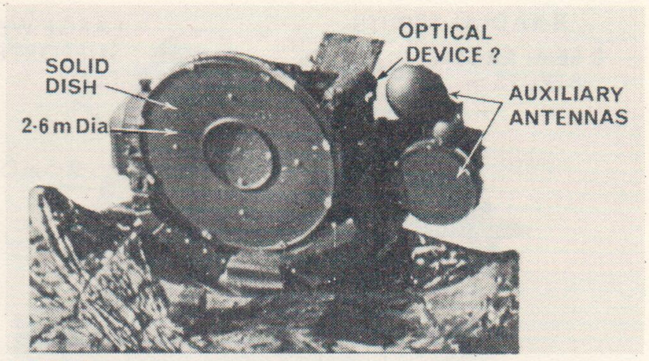
CONFIDENTIAL

POLE DISH


FLAT RADOME
1 m Dia

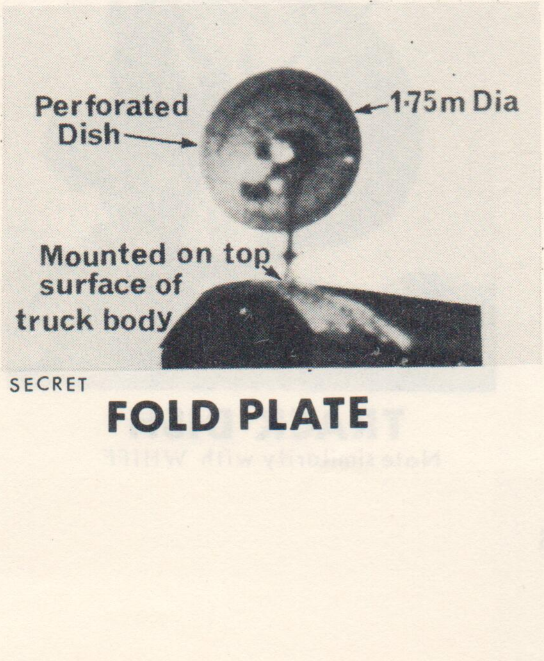
CONFIDENTIAL

GUN DISH


SOLID DISH
2·6 m Dia
OPTICAL DEVICE ?
AUXILIARY ANTENNAS

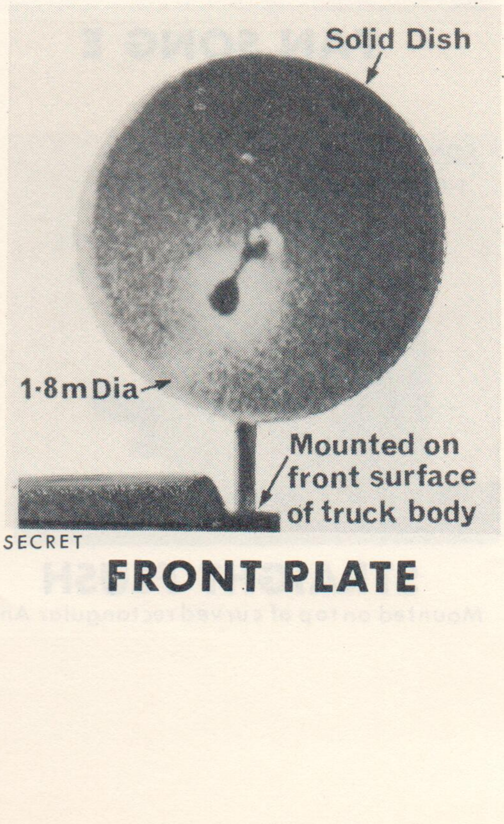
SECRET

PAT HAND


Perforated Dish
1·75m Dia
Mounted on top surface of truck body

SECRET

FOLD PLATE

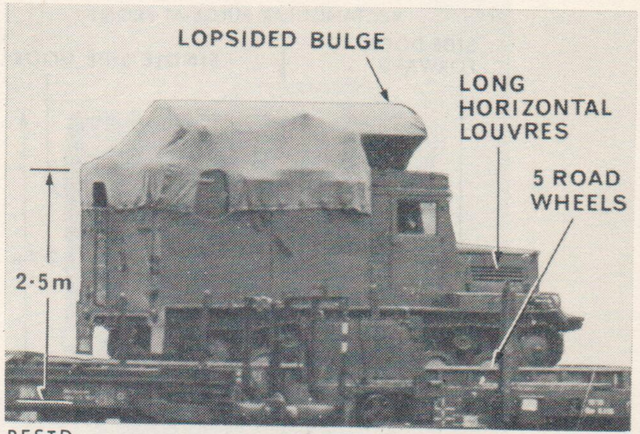

Solid Dish
1·8m Dia
Mounted on front surface of truck body

SECRET

FRONT PLATE

SECTION 2 (Vehicles and Trailers)

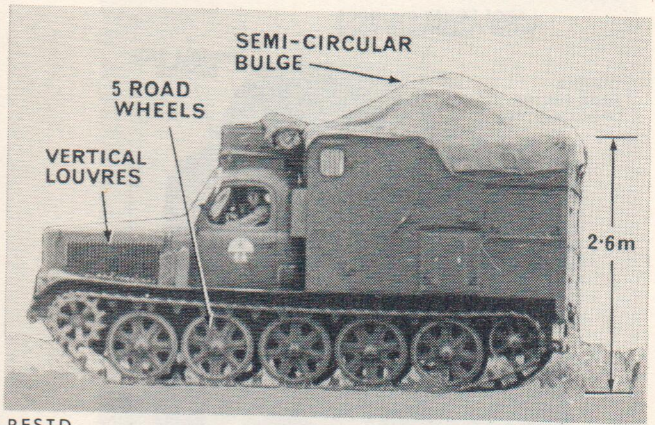
1. TRACTORS


LOPSIDED BULGE
LONG HORIZONTAL LOUVRES
5 ROAD WHEELS
2·5m

RESTD

LONG TROUGH

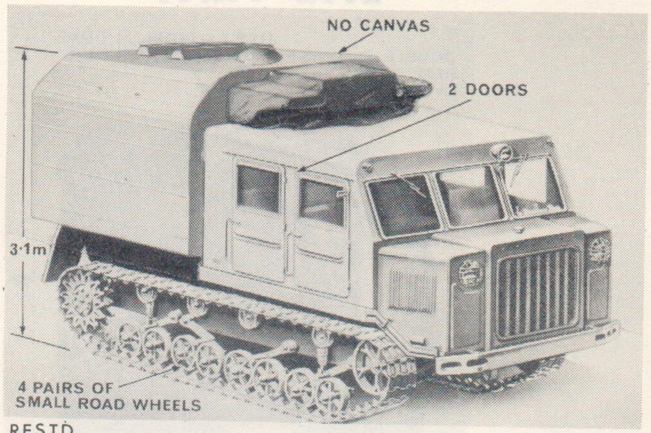
M–2 Tractor – Superseded by AT–L Tractor


SEMI-CIRCULAR BULGE
5 ROAD WHEELS
VERTICAL LOUVRES
2·6m

RESTD

PORK TROUGH/SNAR-6

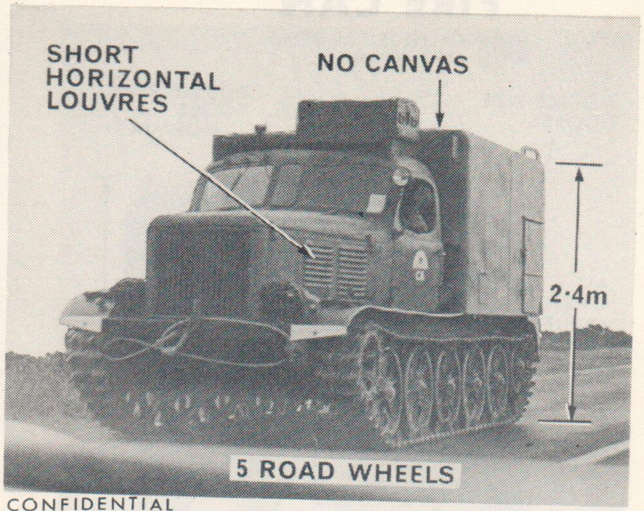
AT–L Mod Tractor


NO CANVAS
2 DOORS
3·1m
4 PAIRS OF SMALL ROAD WHEELS

RESTD

FLAP TRACK

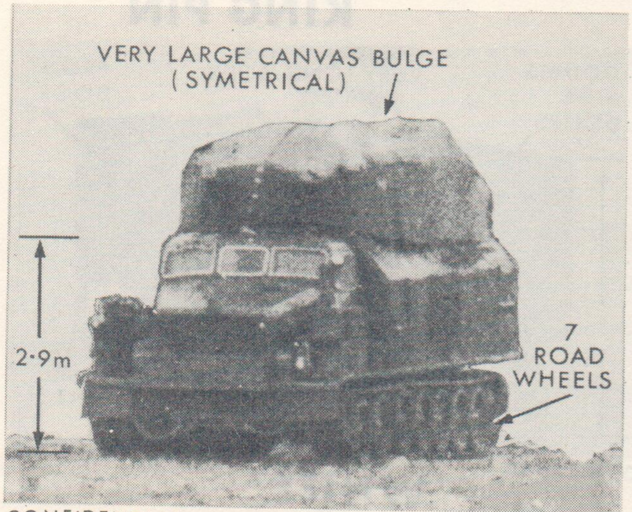
AT–S Tractor


SHORT HORIZONTAL LOUVRES
NO CANVAS
2·4m
5 ROAD WHEELS

CONFIDENTIAL

SMALL YAWN

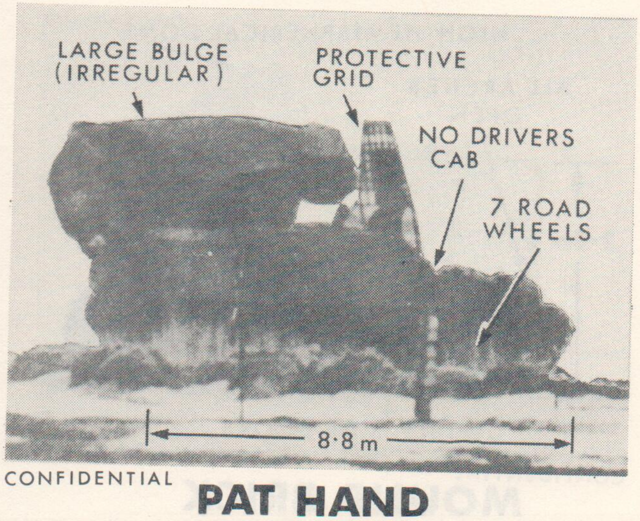
AT–L Mod Tractor


VERY LARGE CANVAS BULGE (SYMETRICAL)
2·9m
7 ROAD WHEELS

CONFIDENTIAL

LONG TRACK

AT–T Tractor

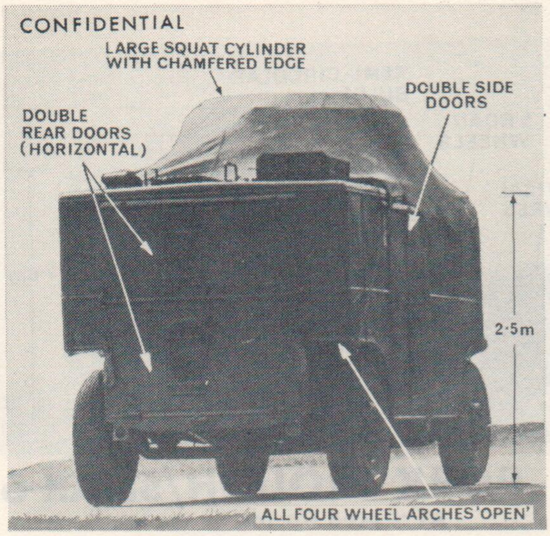

LARGE BULGE (IRREGULAR)
PROTECTIVE GRID
NO DRIVERS CAB
7 ROAD WHEELS
8·8 m

CONFIDENTIAL

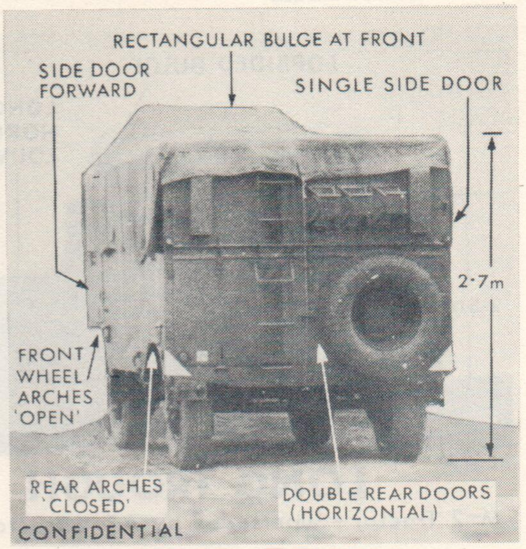
PAT HAND

SECTION 2 (Vehicles and Trailers)

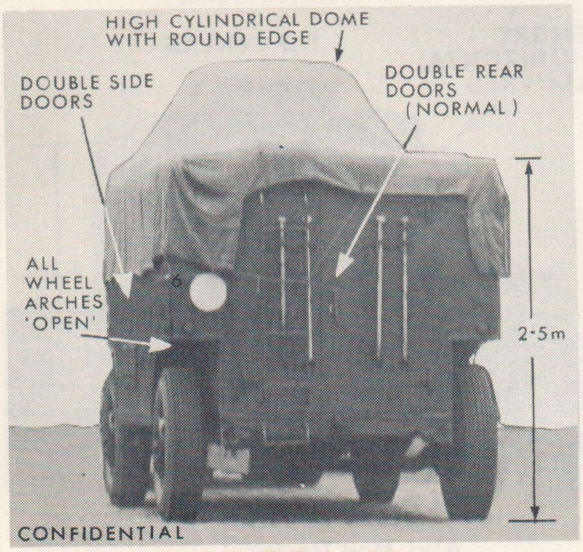
2. TRUCKS and TRAILERS


CONFIDENTIAL
LARGE SQUAT CYLINDER WITH CHAMFERED EDGE
DOUBLE SIDE DOORS
DOUBLE REAR DOORS (HORIZONTAL)
2·5m
ALL FOUR WHEEL ARCHES 'OPEN'

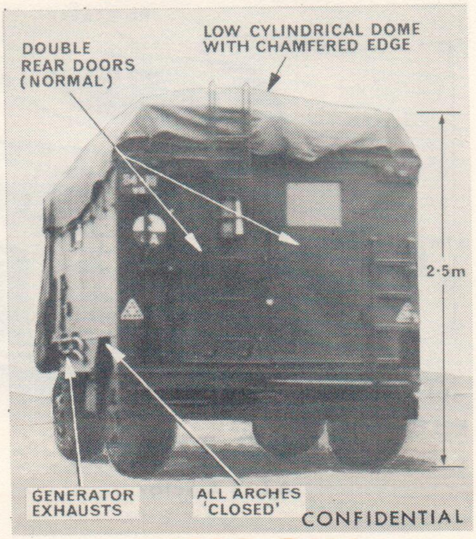
FIRE CAN


RECTANGULAR BULGE AT FRONT
SIDE DOOR FORWARD
SINGLE SIDE DOOR
2·7m
FRONT WHEEL ARCHES 'OPEN'
REAR ARCHES 'CLOSED'
DOUBLE REAR DOORS (HORIZONTAL)
CONFIDENTIAL

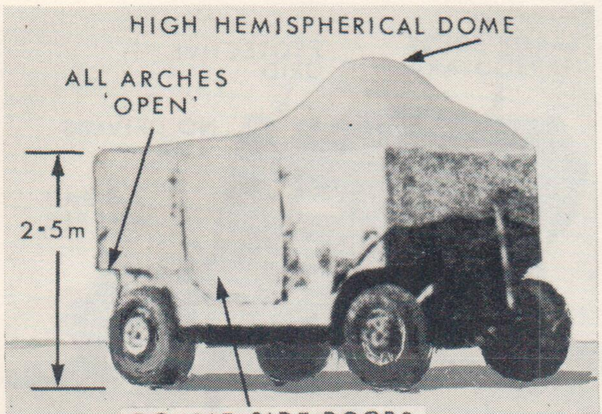
END TRAY


HIGH CYLINDRICAL DOME WITH ROUND EDGE
DOUBLE SIDE DOORS
DOUBLE REAR DOORS (NORMAL)
ALL WHEEL ARCHES 'OPEN'
2·5m
CONFIDENTIAL

TUB BRICK

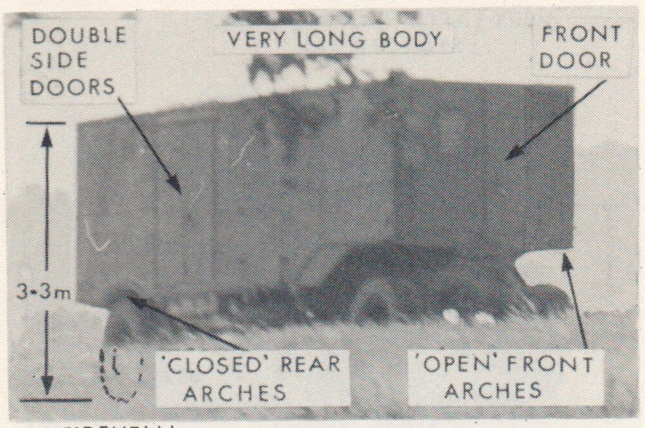

DOUBLE REAR DOORS (NORMAL)
LOW CYLINDRICAL DOME WITH CHAMFERED EDGE
2·5m
GENERATOR EXHAUSTS
ALL ARCHES 'CLOSED'
CONFIDENTIAL

KING PIN


HIGH HEMISPHERICAL DOME
ALL ARCHES 'OPEN'
2·5m
DOUBLE SIDE DOORS

CONFIDENTIAL

MOUND BRICK


DOUBLE SIDE DOORS
VERY LONG BODY
FRONT DOOR
3·3m
'CLOSED' REAR ARCHES
'OPEN' FRONT ARCHES

CONFIDENTIAL

WHIFF

MRL-1 _ _ Very similar to WHIFF but has no Wheel Arches

SECTION 3

Equipment and Unit Associations

RADAR	ROLE	MOUNTED ON	TOWED BY	SEEN WITH	FOUND IN	REMARKS
FIRE CAN	AA Fire control	Short 2-axle trailer	ZIL-151	57 mm AA guns	Div AA Bns	Being replaced by FLAP WHEEL
SMALL YAWN	Mortar location	AT-L tractor	–	Arty LONG TROUGH & PORK TROUGH	Div Arty Obsn Bty Div Arty Regt HQ Army Arty Bde	
END TRAY	Met	Short 2-axle trailer	MAZ-502 KrAZ-214	FROG and SCUD	FROG units (Div) SCUD units (Army and Front)	
FLAP WHEEL	AA Fire control	URAL-375	–	57 mm S-60 AA guns FLAP TRACK, FLAT FACE	Div AA Bns	Replacing FIRE CAN
WHIFF	AA Fire control	Long 2-axle trailer	Tracked veh or ZIL-157	85 & 100 mm AA guns	AA Bns of NSWP armed forces	Replaced in frontline units by FIRE CAN or FLAP WHEEL. Some modified for ECM & Met
FIRE WHEEL	AA Fire control	Long 2-axle trailer	?	130 mm AA guns	NSWP AA units	Obsolete in USSR
MRL-1 and 2	Met	Long 2-axle trailer	?		Static locs	
FAN SONG	SAM Fire control	Short 2-axle trailer	?	SA-2	SA-2 Regts at Front and Army	
TRACK DISH	Mortar location	AT-T tractor	–	Arty	Div Arty Regt HQ Div Arty Obsn Bty	Replaced by SMALL YAWN in USSR
STRAIGHT FLUSH	SAM Fire control	Tracked veh	–	SA-6	SA-6 Regt at Army – may be allocated to Div	
BRICK ROUND/ BRICK SQUARE	Radar DF	Pole	–		Some static sites	Replaced by POLE DISH
POLE DISH	Radar DF	Pole on tripod or GAZ-69	–	CHUCK LUCK SPIKE TWO	Div Intercept Coy Army Arty Obsn Regt Army Early Wng Bn	
GUN DISH	AA Fire control	Modified ASU-85	–	Mounted on ZSU-23-4 quad 23 mm AA system	Regt AA Bty	Seen in pairs
PAT HAND	SAM Fire control	Modified AT-T tractor	–	LONG TRACK SA-4	Army & Front SA-4 Bde	
FRONT PLATE/ FOLD PLATE	Radar intercept	ZIL-157	–		Intercept units	
LONG TROUGH/ PORK TROUGH	Surveillance	AT-L tractor	–	Arty SMALL YAWN	Div Arty Obsn Bty Army Arty Bde	LONG TROUGH replaced by PORK TROUGH
FLAP TRACK	AA Fire control?	AT-S tractor	–	57 mm S-60 AA guns FLAP WHEEL	Div AA Bn	
LONG TRACK	Air surveillance Tgt acquisition	AT-T tractor	–	THIN SKIN, PAT HAND, SA-4, SA-6	Army SA-4 & 6 Regts Front SA-4 Regts	
TUB BRICK	Jammer?	Short 2-axle trailer	MAZ-502	MOUND BRICK, CHEESE BRICK, KING PIN	Widely deployed in ECM units incl Army Radar Jammer Bn	Usually in pairs
KING PIN	Passive ECM?	Short 2-axle trailer	URAL-375	MERCURY GRASS TUB BRICK	Army Radar Jammer Bn	
MOUND BRICK	Jammer?	Short 2 axle trailer	?	TUB BRICK CHEESE BRICK	Army Radar Jammer Bn	